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About 6 others were seen in *Orion*, and quite 25 near *Leo*, but times or paths were not noted, most of them until 18^h would be included in the above counts.

November 15. Cloudy all night; rifts in clouds 17^h to 18^h, but no meteors seen through them.

November 16. 11^h to 18^h. Brilliantly clear at times, but no meteors seen by Mr. Bellamy, who kept an intermittent watch.

Observations of the Leonids of 1899 *November* 14 *and* 15, *made at the Radcliffe Observatory, Oxford.*

(*Communicated by A. A. Rambaut, M.A., D.Sc., Radcliffe Observer.*)

At the Radcliffe Observatory we made careful preparations for observing the *Leonid* shower this year.

Our attention was chiefly devoted to an attempt to photograph some of the meteor trails and to an enumeration of the meteors seen. The staff of the Observatory being limited in number, it seemed to me best to confine observations to these two objects; and as the results obtained by Professor Pickering and one or two others in recent years seem to show that even a few photographic trails will give a better determination of the actual position of the radiant point than a much larger number charted down by eye and hand, I decided, after some hesitation, not to attempt any observations by the latter method.

For the photographic observations a camera carrying a Ross portrait lens of 4½-inch aperture and about 18 inches focal length was attached to the declination axis of the Barclay 10-inch equatorial, the latter being used as a guiding telescope during the exposure of the plates. The camera was adapted for whole plates, which covered a field of about 30° by 20° on the sky.

From some experiments made previously with this apparatus by sweeping the telescope, we had concluded that if a meteor as bright as a first-magnitude star appeared in the neighbourhood of the radiant point during the exposure of a plate, we should be likely to obtain a photograph of its trail. The plates used were Edwards' Isochromatic Snap Shot Plates.

Unfortunately, however, although Mr. McClellan and I kept exposing plates from shortly after 15^h on the 14th until dawn put a stop to our observations, no trails were obtained.

Mr. Wickham and Mr. Robinson undertook the count of the meteors. They were stationed on the roof of the eastern wing of the Observatory tower. A cable had been temporarily laid to the chronograph, by which Mr. Wickham was enabled to register the time of appearance of each meteor to a fraction of a second. Mr. Robinson was also furnished with a pocket enumerator registering up to 12,000. Unfortunately, the richness of the display fell so far short of anticipation that the value of these

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arrangements for registering the numbers was not put to the test.

Our watch commenced at 10^{h} on November 14. At 11.30, however, the sky became overcast, and remained so until about $14^{h}\ 30^{m}$, when the clouds lifted towards the east.

The number of *Leonids* observed in each quarter of an hour is given below. The actual times of appearance of thirty-one meteors observed by Mr. Wickham have been read to the nearest second from the chronograph, but it does not appear necessary to print these times.

G.M.T.		No. of Meteors Observed.
h	m	
14	45	
		5
15	0	
		2
15	15	
		2
15	30	
		3
15	45	
		4
16	0	
		0
16	15	
		3
16	30	

G.M.T.		No. of Meteors Observed.
h	m	
16	30	
		3
16	45	
		5
17	0	
		4
17	15	
		8
17	30	
		9
17	45	
		5
18	0	
		6
18	15	
		1
18	30	

In all only sixty *Leonids* were recorded, of which thirty-seven were noted by one observer and thirty-five by the other. In addition several sporadic meteors were also seen.

The increasing number of meteors between $16^{h}\ 30^{m}$ and 18^{h} may possibly be due to the darkening of the sky as the Moon approached the horizon. It set at about 17^{h} G.M.T.

At $17^{h}\ 40^{m}\ 1^{s}$ a very brilliant meteor was seen by all four observers. It passed from *Leo* through a point midway between *Polaris* and *Capella.* It exhibited a bright train which nearly disappeared after two or three seconds. Then a portion of the train reappeared, brightened, and quickly changed form. After a little while the train bent in the middle and seemed to consist of two straight portions inclined at an obtuse angle to each other. By $17^{h}\ 41^{m}$ it had become indefinite and distorted into an irregular sinuous figure. At $17^{h}\ 43^{m}$ it seemed to hang from the star 22 (Hev.) *Camelopardali,* and had drifted a little towards *Polaris.* At this time its axis was situated at right angles to its former position. It eventually broke into two portions and faded away at $17^{h}\ 46^{m}\ 4^{s}$.

On the following night (November 15) a watch was again instituted, but up till midnight a fine drizzle prevailed, and the sky remained obstinately overcast until after 17^{h}. At about $17^{h}\ 30^{m}$ the clouds began to part, and breaks occurred large enough to reveal whole constellations at a time, but no meteors were seen. These breaks were sufficiently open and numerous to

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enable a definite opinion to be formed that the radiant then was very inactive. The sky again became overcast at 17^h 46^m, and remained so until after sunrise.

Observations of the Leonids of 1899, *made at Durham Observatory.*

(*Communicated by Professor R. A. Sampson.*)

Preparations were made for a count of the expected shower upon a plan adapted from that of Professor E. C. Pickering's Harvard Circular. Maps and directions were given to between thirty and forty correspondents, here and at various places in Yorkshire, Durham, and Northumberland. The sky was divided into six segments, meeting at the radiant and passing through (1) *Regulus*—ϵ *Hydræ*, (2) ϵ *Hydræ*—*Pleiades*, (3) *Pleiades*—*Pole*, (4) *Pole*—ζ *Ursæ Majoris*, (5) ζ *Ursæ Majoris*—β *Leonis*, (6) β *Leonis*—*Regulus*. Each observer was to count the number of meteors appearing per minute in his own segment. It was hoped that thus the count might be pushed nearer the maximum, and perhaps some result of interest might appear as to whether the shower began on one side and died away on another. In the actual event the display was so meagre that the directions given were unsuitable, and little interest attaches to the observations except as an item of the average.

At the Observatory watch was kept on November 11, 12, 13, 16^h 30^m—18^h; and November 14, 15, 11^h—18^h. On the 12th, 13th, and 14th it was densely clouded. Mr. F. C. H. Carpenter and myself watched on the 11th, and on the 14th and 15th we were joined by six of my students. We saw the following meteors, besides others which were not from the radiant in the Sickle. The paths of some of these were charted.

No.	Time.			Segment of Sky.	Note.
		h	m		
1	Nov. 11	17	31	5	b k g.
2	15	13	27	6	

Between 13^h 27^m and 15^h 40^m, five or six meteors seen, of which exact record was not taken.

		h	m		
3	Nov. 15	16	3	2	
4		16	14	2	k or.
5		16	26	6	k y.
6		16	33	5	
7		16	35	3	
8		16	38	4	k bl.
9		16	41	6	k g.
10		16	42	6	k bl.